REDUCED COMPLEXITY CHANNEL ESTIMATION FOR WIRELESS COMMUNICATION SYSTEMS

ABSTRACT

Techniques to derive a channel estimate using substantially fewer number of complex multiplications than with a brute-force method to derive the same channel estimate. In one method, an intermediate vector $\underline{\mathbf{B}}$ is initially derived based on K sub-vectors of a vector $\underline{\hat{\mathbf{H}}}$ for a channel frequency response estimate and at least two DFT sub-matrices for a DFT matrix $\underline{\tilde{\mathbf{W}}}$, where $K > 1$. An intermediate matrix $\underline{\mathbf{A}}$ for the DFT matrix $\underline{\tilde{\mathbf{W}}}$ is also obtained. A least square channel impulse response estimate is then derived based on the intermediate vector $\underline{\mathbf{B}}$ and the intermediate matrix $\underline{\mathbf{A}}$. In one implementation, the intermediate vector $\underline{\mathbf{B}}$ is obtained by first computing DFTs of a matrix $\underline{\hat{\mathbf{H}}}_{T\times L}$, which is formed based on the vector $\underline{\hat{\mathbf{H}}}$, to provide a matrix $\underline{\mathbf{G}}_{L\times L}$. Inner products between the columns of a base DFT sub-matrix $\underline{\mathbf{W}}_1$ and the rows of the matrix $\underline{\mathbf{G}}_{L\times L}$ are then computed to obtain the entries of the intermediate vector $\underline{\mathbf{B}}$.